

# Capacity Expansion of Flash Memory Device with a Daisy-Chainable Structure and an Integrated Hub

## Abstract

A chainable Universal-Serial-Bus (USB) flash-memory drive has both a female USB connector and a male USB connector mounted on a printed-circuit board (PCB) substrate. A USB hub mounted on the substrate connects to a host through the male USB connector. One of the ports of the USB hub is connected to the female USB connector to allow the host to connect to downstream USB devices connected to the chainable USB flash-memory drive. Other ports of the USB hub connect to one or more flash controller chips that drive flash memory chips. The flash memory chips may be mounted on the substrate, or may be on daughter-cards that plug into sockets on the chainable USB flash-memory drive's substrate. The flash controller chip may be mounted on the drive substrate or on the daughter-cards. Several chainable USB flash-memory drives may be connected together in a daisy chain.